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Neish, James

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ON

A NEW BEVERAGE SUBSTANCE,

THE

KOLA NUT,

A Product of Jamaica.

A LECTURE,

BY

JAMES NEISH, M.D., F.R.C.P.S., CAN.

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ON A NEW BEVERAGE SUBSTANCE, THE KOLA NUT, A PRODUCT OF JAMAICA.

In this Lecture I propose to bring under your notice some account of the Kola-nut, the seed of a tree growing in this island. It will be my aim to show that we have in this product a new resource of great value and importance. I shall endeavour to point out the great intrinsic value of the kola-nut on account of its medicinal qualities, and more particularly on account of its adaptability to take a place by the side of coffee and chocolate as a beverage-substance, partaking as it does of the qualities of both these staple articles of our agriculture and commerce. I shall also notice the horticultural capabilities of the kola as a hardy tree of easy culture and as adapted to be grown extensively on large areas of unoccupied and otherwise unprofitable lands in Jamaica. Here, then, is a prospect full of interest and promise, which, if it can only be realised, will shed a ray of hope and be as a silver lining behind the cloud of agricultural depression that is still weighing so heavily on the sugar-planting and other rural interests in this island. It will be shown in the course of the remarks that this new beverage-substance may be produced on lands that are now of but little profit for sugar. The addition to our agricultural resources of a cultivation which, in all probability, is destined to take rank with that of coffee, whilst not demanding so much labour in its picking and preparation as the coffee-berry does, and which promises to be easier than and quite as profitable as that of cacao, and yet capable of greater extension than chocolate, because the kola is a hardier plant and more adapted to a variety of soils and climate than is the very delicate theobroma or chocolate,—such an addition to our resources, I may say, cannot be regarded as unimportant; and I am confident that you will lend me your attention even whilst I am occupied with some of the drier details of the subject.

The earliest accounts of the kola tree are contained in the reports of African travellers. The nut is known to have been in use amongst the natives of Western Africa and the Soudan for various purposes from early times. In Western Africa it is used to render the half-putrid water of pools agreeable to drink by infusing into it some powdered kola-nut, whereby it is cleared and rendered palatable and refreshing. The medicinal uses of kola seed by the natives of Africa have not escaped the notice of travellers. It is said

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to be in use there, very much as it is among the creoles of Jamaica, as a masticatory, being chewed for the sake of its sustaining and tonic power. In Western Africa it is said to have acquired a reputation for curing liver diseases, and a variety of disorders which may be classed as dyspeptic.

The notices of this plant contained in accessible standard botanical works are all very short and insufficient. Thus Balfour, in his "Manual," a work specially prepared for medical practitioners, and which is usually full in all that relates to medicines, simply mentions it, saying, "The kola mentioned by African travellers as being used to sweeten water is the seed of *Sterculia tomentosa* or *acuminata*." Rhind's History of the Vegetable Kingdom, which is a compendious work, and specially devoted to tropical fruits, does not even mention the kola. In this dilemma as to botanical authorities, I have gladly availed myself of the very kind proposal of Mr. Fawcett, the Director of the Public Gardens, to prepare an abstract on the botanical characteristics of the Kola tree. I am greatly indebted to him for the following comprehensive notice:—

"Botanical Notice of the Kola Nut.—The genus Cola belongs to the order Sterculiaceæ, which is very nearly allied to the Mallow family, (Malvaceæ).

"Many of the properties of the two families are similar. The mucilage, so abundant in the okra, one of the mallow family, is found more or less throughout both families; in the Sterculia family the best example is the bastard cedar (*Guazuma tomentosa*) from the pods of which the mucilage obtained by infusion was formerly used instead of gelatine or albumen in clarifying cane-juice.

"The oily seeds of cotton in the Mallow family and of chocolate in the Sterculia family may be cited as a general characteristic, though one of the advantages of the kola-nut is that it is not oily.

"The seeds of a tree (*Sterculia Carthaginensis*), which grows well at Half-way Tree and Kingston, are eaten as nuts in Brazil and Panama. The seeds of an Indian species (*Sterculia urens*) are roasted and eaten, and also used to make a kind of coffee; from the bark a gum somewhat like tragacanth is produced.

"The name kola nut is applied apparently to seeds of several species belonging to the order, but those most prized in the African markets are the produce of *Cola acuminata*, R. Br., and its varieties.

"The kola tree varies much in the form and size of its leaves and flowers, in the appearances of the pods and the colour of the seeds. But the strangest variation occurs in the number of the cotyledons. In the pea and bean, the

seed splits up into two distinct, equal halves, which lie flat against one another;—these are known in botanical language as cotyledons. In the seed of the chocolate, the cotyledons are not flat, but folded to some extent upon one another; they are, however, two in number. All flowering plants are divided into two classes according as they have one or two cotyledons, palms, grasses, lilies, and orchids having only one, almost all the rest having two. Now it is stated on the authority of Barter, who made extensive collections of plants in Guinea, the native home of kola, that the number of cotyledons varies from two to five, even in seeds taken from the same pod. In the few seeds which I have had the opportunity of examining in Jamaica, I have never found more than two cotyledons, though they are sometimes much distorted and apt to become split up in drying. Barter also says that the seeds with two cotyledons are more highly prized than the others.

"The pods of chocolate and kola differ in structure. In chocolate a single flower produces a single pod with five divisions; but in Kola the five divisions are always separate, so that each flower produces five pods, each with five to twelve seeds. A single flower may therefore yield as many as fifty seeds.

"Kola is a native of Guinea, one of the hottest parts of Africa, and was probably introduced into the West Indies with the akee in slave-ships. It grows well at Bath, in the Wag-Water Valley, Portland, and probably would succeed wherever cacao grows, in a moderately rich, moist soil. It is propagated by seeds, and will begin to bear after four or five years. There are trees near the Botanic Garden, Castleton, which were planted over fifty years ago, still in perfect health, and bearing fruit regularly. The trees should be planted about 20 feet apart, which would give 108 trees to the acre. The trees grow about 40 feet in height. Those near Castleton produce from 500 to 800 pods each crop. If each pod contains on a moderate calculation 4 seeds, and if we say 50 seeds to a quart, then a tree with 600 pods will give 50 quarts of nuts twice a year, or 100 quarts per tree per year. A quart of dry nuts will weigh a little over 1¼lb—125lbs a tree. A tree in full bearing, and under careful cultivation, would probably produce 150lbs of nuts a year."—From an abstract prepared by W. Fawcett, Esquire, Director of the Public Gardens.*

* The Lecturer is also indebted to the kind interest taken by Mr. Fawcett in furnishing dried specimens of the leaves and flowers of *Cola acuminata*, together with a number of growing seedlings in bamboo pots, which graced the table. Specimens of kola-nuts from the Museum of the Institute, grown in different parts of the Island, and specimens of dried pods illustrating the period of maturity of the seeds, and other specimens to exhibit the cotyledons, etc., collected by the Author, were also shown and demonstrated.

So far I have met with no account of the introduction of kola into Jamaica; but it was probably introduced into this island during the era of the slave-trade; and it may not be too far-fetched a supposition to imagine that the seeds may have been brought from Africa as the sole and valued treasure of a slave. At any rate there is some evidence to show that the old slaves, if not the introducers, were at least the conservators of the plant in this its new home, where it is now thoroughly naturalized. If we accept the view that it was introduced into this island at the same time as the akee, we have the authority of Bryan Edwards for fixing the date at 1778, when Dr. Thomas Clarke, the first Island Botanist, obtained it on board a West African slave-ship. The akee was again introduced into Jamaica, from St. Helena, by the celebrated Captain Bligh, in 1793, in the memorable voyage of the Providence, which brought the bread-fruit to Jamaica. It is therefore probable that the kola tree has been naturalized in this island for upwards of a century. My first acquaintance with the kola was made soon after the time of my arrival, some eleven years ago, when it was pointed out to me as growing in that part of an abandoned sugar-estate known as the "negro-house-piece," where I found it flourishing as a goodly solitary tree amid the cocoa-nut palms, the star-apple trees, and old tamarinds, which had been planted by the negroes in their yards, whilst their cottages and former dwellings had entirely disappeared. These old negro-house gardens are picturesque and interesting features of many a sugar estate; and they furnish good hunting grounds to the economic botanist, who is sure to find something of interest amidst the variety of vegetable growth to be found there. On the occupied estates such places now constitute the cocoa-nut walks, the tamarind avenues, and orange-groves, left as a legacy by the departed slaves. At that time, and in that particular part of the island, the "Byssi" tree, as it is called by the creoles, was rather scarce and a rarity, but I subsequently found it growing in other much similar places, and also planted in the house-grounds of the small settlers; but it was not then grown to the extent that it now is, for of late years there has been a considerable diffusion of the plant in various parts of the island. This increased diffusion is partly due to increased attention given to it, owing to publicity, and partly to an increased appreciation of its virtues by the country people, so that at length the fruit has come to make its appearance in the Kingston markets, and is bought and sold amongst the natives. It is used by them as a masticatory, and an infusion is made of the grated nut and used as a stomachic and carminative in colics, etc., taking the place of ginger-tea in domestic medicine. So far as I can gather,

these are the only uses made of the kola-nut by the lower classes; but certain of the higher classes, living in country districts, have been made aware from what has passed in the newspapers of late of the value of kola prepared as a beverage, and have been in the habit of consuming it.

It was about five years ago that the kola-nut began more particularly to attract attention, and notices of it began to appear in the journals. In the early part of 1882, Messrs. Heckel and Schlagdenhauffen, the latter formerly a Professor of Chemistry at Strasburgh, published a notice of Kola, which appeared in the *Comptes Rendus* and other journals. The *Lancet* of April 8th, 1882, published a summary of the researches of these French chemists, which remains succinct and comprehensive to the present time. The literature of the subject is so scanty, that it may be permissible to quote entire the short article which appeared in the leading English medical journal. It is as follows:—

"The Kola or Gourou Nut.—These seeds, called also Ombémé nuts, are the produce of *Sterculia acuminata*, belonging to the Natural Order Sterculiaceæ, and are known to us by the accounts of West African travellers, who state that when chewed or sucked, they possess the power of rendering the flavour of water, even if half-putrid, agreeable, and they were believed to contain caffeine. They have recently been made the subject of analysis by Messrs. Ed. Heckel and Fr. Schlagdenhauffen, who have found that they do actually contain more caffeine than the best samples of coffee that could be procured, and that this base is altogether free and uncombined—not, therefore, as in the coffee-berry, united with an organic base; secondly, that they contain a very appreciable quantity of theobromine, which assists the action of caffeine and possesses similar properties to that base; thirdly, which is an important fact, that they contain a considerable quantity of glucose, of which cacao presents no trace; fourthly, that the quantity of starch present is three times greater than that contained in theobroma, which explains its nutritive value; fifthly, that there is but little fat, in which respect it differs notably from cacao; and, lastly, that they contain a special form of tannin, which approximates caffeo-tannic acid in its composition, and red colouring matter very similar to that named by Payen cacao-red. The physiological examination of this substance has shown that its properties are essentially due to the caffeine and theobromine it contains. The seeds, it appears, have long been in use in Soudan and Western Africa, for the relief or cure of diseases of the intestine and liver, and especially in cases of atony of the digestive tract, and also as a masticatory and tonic, like the areca nuts, which are held in such high esteem by the natives of

India. Medically they may come to occupy a prominent place by the side of coca and other anti-metabolic remedies, to which they would probably prove superior in consequence of the tannin they contain."—*Lancet*, April 8, 1882, page 575.

About that time, and on seeing the above, I wrote a communication to Mr. Morris, the Director of the Public Gardens, on the subject, pointing out the occurrence of the tree in Jamaica, and how desirable it would be to extend its cultivation, the substance of which letter he embodied in a note contained in the Annual Report of the Public Gardens and Plantations for 1882. The notice is as follows:—

"Kola Nut.—This tree, which has lately attracted considerable attention, is common in many parts of the island under the name of Byssi, and seeds can be obtained, in quantity, if required for commercial purposes. Dr. Neish, of Port Royal, to whom I am indebted for a note on this product, remarks, 'What enhances the value of kola-nuts at the present time is the fact that citrate of caffeine,—a medicine now much employed for the relief of sea-sickness, megrim, and other nervous complaints—can be readily obtained from these nuts, for the reason that the nuts contain more caffeine than coffee-berries; and in the kola-nut the caffeine is in the free or uncombined state. These nuts are likely to take their place in the market as furnishing a nutrient and stimulant beverage. Rich in the active principle of coffee, containing also a large proportion of theobromine, the active principle of cacao, these nuts, in addition, contain three times the percentage of starch contained in chocolate; and, moreover, they also contain less fat, so that, in addition to stimulant and nutritive properties, there is the probability that a chocolate prepared from them will more readily agree with delicate stomachs.'

"The suggestion made by Dr. Neish that a chocolate might be prepared from the kola-nut seems a very appropriate one, for both the cacao and kola belong to the same natural order Sterculiaceæ, and the habits and characteristics of the two are very similar. They both affect low, warm situations, and in view of the probable demand for kola-nuts, attention might very well be given to their cultivation."—From the Annual Report of the Public Gardens and Plantations for the year ending 30th September, 1882. By D. Morris, M.A., Director.

This notice having been copied into the leading newspapers of the island, gave an impetus to the dissemination of the kola tree; and two years later, namely, in 1884, Mr. Morris reported as follows:—

"Kola Nut.—(*Cola acuminata.*)—This interesting plant

is largely distributed in the island, and its cultivation is being extended in the hope that ultimately kola-nuts may become a recognized article of commerce. The tree is hardy and easily established, and there would be no difficulty in supplying large quantities of the nut every year. Locally the nuts are used as a stomachic and tonic. They are said to have effected very remarkable cures in dyspepsia and allied disorders, and are used for this purpose in the same manner as cacao or chocolate. It is prepared by grinding the dry cured nut into a powder and mixing with boiling water, sugar and milk. Some people use the kola-nut regularly at breakfast in this manner, and consider it superior to everything else of the kind. Seed nuts are to be obtained in the months of June to September, and if intended for shipment should be planted in soil. To cure the nuts for export they only require to be taken out of the pods and subjected to careful drying in the sun until quite firm and hard. The process, however, requires to be thoroughly done, owing to the thickness of the cotyledons, and to prevent mouldiness on the voyage."—From the Report of the Public Gardens and Plantations for the year ending 30th September, 1884. By D. Morris, M.A., F.L.S., Director.

Although the tree has become plentifully diffused throughout the island, there is not as yet any export trade in the product. It simply furnishes, as already stated, a petty trade in the markets, and that which does not enter the markets is consumed locally. There is, however, an immediate prospect of the Jamaica article entering into commerce, since a demand exists for kola-nuts both in France and England, and some London merchants, it has been recently mentioned, are taking steps to obtain a supply from Jamaica. It has been stated that at present one manufacturer alone receives nearly the entire importation into England. Good sound kola-nuts are now worth in the English market as much as one shilling per pound. In 1886 they were worth 70s. to 90s. per cwt.

To show that a demand exists for this article which is but ill-supplied, I may mention that at the close of 1886 an attempt was made to impose upon the French market a spurious article. The commerce in the genuine kola-nut is at present limited to African sources, and it is not plentiful because it is not cultivated. To meet the demand, a singular and audacious attempt was made to foist upon the market an inferior but much more easily obtained substitute. This stuff fell into the hands of the same French chemists and physiologists who were the first to analyse kola-nut, and upon whose analysis and statement of physiological properties, I based my letter to Mr. Morris, recommending it as a beverage

material, the subject-matter of which letter has been already quoted. These chemists, Messrs. Heckel and Schlagdenhauffen, published their account of the fraud in a French medical journal, *Nouveaux Remèdes*, in March and April last (1887,) and in their description they consider the substitution to be an intentional adulteration, *due to the increasing demand for kola-nuts*. Under the microscope the adulteration can be detected by the smaller size of the polygonal starch grains, which are only half the size of those of the true kola-nut. In the entire state the kernel is easily distinguished by the fact that one of the cotyledons is hardly half the size of the other, fitting into the substance of the larger one, and that the shape of the seed is orbicular and flattened. Chemical analysis of the false kola-nut shows it to be destitute of that which gives the principal value to the true product; that is to say, it contains not a trace of caffeine, and therefore it is utterly valueless to the chemical manufacturer. When I first read of the introduction of a substitute for the kola-nut, I felt not a little concern that it might injure the prospects of kola cultivation in Jamaica, which had been advocated by Mr. Morris and myself, but the *dénouement* of the fraudulent attempt leaves kola in its unique position as the easiest and best source of caffeine. Thus, therefore, the medicinal value of the kola-nut is securely established against this rival. The tree bearing the false kola-nut is the *Heritiera littoralis*, belonging to the same family as the kola, and described as common on African river-banks, and in the East-Indian Islands and the Phillipines. Had it proved a useful substitute, it could have been abundantly supplied, and the new cultivation of our naturalized kola trees would have had to encounter competition from the start.

It will be seen from what has preceded that there is still an unsatisfied demand for the kola product, mostly for the purpose of manufacturing into the salts of caffeine employed in medicine. I shall hereafter have something to say about the valuable properties of these salts when discussing the therapeutical properties of the kola-nut; but at this stage I wish simply to remark that these preparations of caffeine are almost quite new, but that their use is extending among the medical profession, and that, from their special value in particular cases, their use bids fair to become still more extended. Caffeine and citrate of caffeine were only included in the last edition of the British Pharmacopœia, of September, 1885, as official drugs, consequently their authoritative recognition is quite recent, and as a medicine caffeine is simply at the beginning of its useful career. To satisfy the requirements of the manufacturing chemists, which are sure to increase, would of itself justify an extended cultivation of the kola,

and would reward those who had the first enterprise in energetically taking it up.

But this is not all; the prospect justifying an extended cultivation is still wider. This lecture affords an opportunity to enlarge upon the suggestion which I made in 1882, and enables me to assert the eminent fitness of the kola-nut to take its place along with coffee and chocolate as a dietetic beverage material. For this purpose the kola-nut has distinctive qualities of its own. It may be said to blend the qualities of coffee and chocolate together, but this in a manner not to be effected by the mere mixing of the two substances. It is not to be regarded as a rival to coffee, nor to chocolate, but as an additional and definite substance, forming a third material in the group from which to select a breakfast beverage. No doubt the introduction of the new material upon the world's market will take time. It must needs be so; but equally will time be required for the kola to reach its place as an article of staple cultivation. There is this to be said in this connexion, that the existing demand for the article for medicinal purposes will serve to repay those who first enter on the cultivation; and that, as kola coffee comes into use as a beverage, the requirements of commerce will have to be provided for by extended planting and cultivation.

In referring to the subject of dietetic beverages generally, (which may now occupy our attention as introductory to the special subject), it may be remarked that, besides tea, coffee, and chocolate, some others have a limited or local use, namely, paullinia or guarana, Paraguay tea or maté, and kola-nut or byssi. The first named is used in Brazil, and has been introduced into Paris, but failed to find favour with the French on account of its bitterness and astringency; it is, however, still used by them as a medicine for the relief of migraine and neuralgia. The plant producing guarana is the *Paullinia Sorbilis*, closely allied to the supple-jack of of the Jamaican woods; the seed is the part used, which is made into a dried paste and sold as guarana. Paraguay tea is the leaf-product of the *Ilex Paraguayensis;* it does not enter into European commerce, but large quantities are exported from Paraguay for consumption in the adjoining countries of South America. The kola-nut is just beginning to be consumed in Jamaica, and its qualities are just coming into public notice in England. What is remarkable about the entire list is that they each contain as active principles a crystallisable alkaloid, caffeine, chemically identical in tea, coffee, paullinia, Paraguay tea and kola-nut, and very closely allied in chocolate. The crystallisable alkaloid of tea used to be and is still named *theine*, but it is chemically iden-

tical with *caffeine*, both having the same analytical formula, $C^8\ H^{10}\ N^4\ O^2$ and H^2O. The formula for the active principle of chocolate shows it to be simpler in constitution; this is named *theobromine*, having the composition $C^7\ H^8\ N^4\ O^2$. To those who have some knowledge of organic chemistry the close relationship of caffeine to theobromine will be obvious, for if one atom of hydrogen in theobromine be substituted by the compound radical methyl, the formula for which is CH^3 caffeine is formed theoretically as a substitution compound, and hence the chemical name for caffeine becomes "methyl-theobromine." Caffeine is contained in the following proportions in the beverage substances named:—in tea, about 2 per cent.; in coffee, 0.8 to 1.3 per cent.; in prepared guarana, 5 per cent.; in Paraguay tea, about 1.2 per cent; and in kola-nut, 2.3 per cent., which last will be noticed as a very high percentage.

The alkaloids from all these sources have two properties in common; they are stimulant and anti-metabolic; and thus it is that the substances which contain them, when blended with nutritious matter, are suitable for use as beverages in the dietary. The term "anti-metabolic" will require explanation. It is a word used to express the arrest of tissue-change in muscle and brain, and nerve and other tissues, which ordinarily goes on in our bodies in the course of our daily exercise. An anti-metabolic substance, then, is one which checks exhaustion.

Tea furnishes a good example of this combined action of stimulation with a check to the processes of wear and tear. The stimulant and cheering qualities of tea are too well known to require dwelling upon; its nutrient qualities, however, are slight, but it will be interesting to know that, the younger the leaf is picked, the more stimulant and nutritious it is. This is a matter of quite recent discovery; and as tea as an article of cultivation has its claims for attention in Jamaica, where we have land and climate extending from the plains to the Blue Mountains in every way suitable to it; and as tea cultivation in this Island is one of the possibilities of the near future, I present the fact to the public that in due time it may bear fruit. It has been ascertained that the young leaves of tea contain more of the active principle, *theine*, than old leaves, that the chief nutritious element is a mineral substance, phosphate of potassium, which is soluble in tea infusion, and which of itself possesses restorative qualities; whilst as the leaves get older they contain more woody fibre and astringent matter, and the soluble phosphate of potassium undergoes a chemical change into phosphates of lime and magnesia, which are insoluble and inert. There can be no good tea unless it consists of the young leaf; and

the earliest spring growth is that which makes the most valuable commodity.

Coffee is a strong cerebral stimulant; it is also an anti-metabolic of great power. As a dietetic beverage, if we omit the populous Chinese and restrict ourselves to European nations and their colonists, it is of more universal consumption among them than tea, though the consumption of tea by the English, the Americans, and British colonists results in a commerce which is truly immense. Used as a beverage, coffee is stimulant to the nervous and tonic to the muscular systems. It slowly strengthens the force of the circulation, and it is by this mode of effect that it acts as a tonic and diuretic. As a cerebral stimulant coffee beverage is resorted to by students and authors, by orators and statesmen, and by all who have to undergo intellectual labour. A cup of strong coffee stimulates the brain and rouses it from torpor; mental action is excited by the draught, and a flow of ideas is promoted. If taken late at night, it is apt to produce sleeplessness by its exciting action on the brain; if, on the contrary, it be taken in the morning, its effects extend to the digestive system, and the powers of the stomach are assisted. For instance, an eminent authority on dietetics recommends that when the breakfast consists of a substantial meal, say of meat, or even of oatmeal porridge, coffee should form a part and be taken at the end of the meal, to prevent mental torpor from the effects of the food and to assist digestion. This recommendation could now with propriety be made to include kola.

The stimulant powers of coffee depend upon a volatile oil as well as on the caffeine which it contains. The volatile oil has been named "caffeone," and it is this which gives the peculiar and well-known delicious aroma which coffee possesses. To produce the aromatic effect in the fullest, coffee-berries should be selected freshly, but not too highly, roasted, and the coffee should be infused merely with boiling water, but should not be boiled. To prepare coffee for its sustaining properties, which it possesses in a remarkable degree, it becomes an object to extract all the caffeine and all the soluble nutritious matter, and this is most effectually done by boiling.

Some years ago, a French authority, M. de Gasparin, communicated to the Academy of Sciences, in Paris, a paper on the value of coffee in the dietary, in which he illustrated the sustaining powers of boiled coffee by referring to the extraordinary feats of labour accomplished by the Belgian miners at Charleroi, on a diet which were it not for the coffee they consumed would be meagre. On one occasion some French miners went to work in the mines in Belgium, but,

according to M. de Gasparin, they could not keep up with the Belgian miners in their daily work, though they were much more fully fed, and they had to give up labour in the mines of Charleroi. The diet of the French workmen contained from five to six and a half ounces of nitrogen, while that of the miners of Charleroi contained less than half an ounce of nitrogen: these amounts of nitrogen are held to represent the amount of flesh-forming substances in the respective diets. But the Belgian miners consumed daily in divided portions, morning, noon, and night, two quarts of boiled coffee made from one ounce of ground coffee. After summing up the constituents of their slender diet, M. de Gasparin added—"To coffee alone can we ascribe the power of satisfying themselves with a diet which children would not bear, and its action is not that of a nutritive substance, for the analysis shows that it does not compose more than a thirty-fifth of the nutritive properties of the food. Coffee, therefore, has other properties, which are very important. Does it aid the digestive functions? Does it produce a more complete assimilation? or does it, perhaps, retard the nutrition of the organs, which then do not require so great a consumption of materials for repair or maintenance? In this case coffee does not nourish, but prevents denutrition."

The sustaining power of coffee thus attributed by the Count de Gasparin to the prevention of denutrition has been accepted by physiologists and authors on pharmacognosy, and the term anti-metabolic has come into use to express this check to the processes of waste. It will have a bearing on the immediate subject if reference be made here to coca, which is the leaf of the *Erythroxylon coca*, used by the Peruvian and Bolivian mountaineers as a masticatory for the purpose of sustaining them during the fatigue of mountain climbing. Very full accounts of this agent will be found in Mr. Markham's *Travels in Peru* in search of cinchona plants. It is most remarkable as a preventer of denutrition, and its alkaloid, cocaine, is now well known as a local anæsthetic and tonic. The kola-nut, it will be found, bears a strong analogy to coca.

The knowledge which has been gained by long experience of the uses and properties of coffee has a strong interest for us at the present moment, as shedding a light on the properties and qualities of kola as a beverage; for, reasoning by analogy from what is known of the constituents of the two substances, there can be little doubt that what is true of coffee will in the main be found to be true of kola. It will be profitable, therefore, to consider coffee somewhat fully.

Very likely it may be said that one need not have travelled so far as Belgium or Paris for an illustration of the

sustaining powers of coffee; and that here, in Jamaica, an illustration of a most cogent kind could be found in the habits of planters, overseers, and others,who do a surprising amount of physical exertion during the early hours of the morning and up to the middle of the forenoon, sustained solely by the invigorating effects of a cup of "morning coffee." This Jamaican practice of drinking a cup of strong coffee early in the morning is a commendable one, though undoubtedly it would be better on physiological grounds to partake of a modicum of light nutritious food at the same time. It has been fully established that coffee exerts an influence antagonistic to malaria, and it is not to be doubted that morning coffee is useful in this respect, as warding off the attacks of paludal fevers. Trousseau, the great French authority on Therapeutics, cites the evidence of one of his countrymen travelling in Greece, that the inhabitants of the Morea infallibly cut short their intermittent fevers with a mixture of coffee and lemon-juice—thus suggesting in effect that citrate of caffeine might be used for the same purpose. It is desirable, I think, that planters, overseers, and others who are exposed to malarial influences, should give an equal trial to "morning kola" as a prophylactic against malaria, and to sustain them in their physical exertions. Caffeine is an an antiseptic like quinine.

Another property of coffee, not generally known, is that it acts as a local anæsthetic. It is an obtunder of pain manifested in the sensory nerves, and it blunts the special sense of taste. From a few limited experiments with kola, I am inclined to the belief that it agrees with coffee in this respect. It is well enough known that if quinine be suspended in strong coffee it may be taken with only a slight perception of the taste; but it may not be so well known that such a nauseous substance as epsom salts, after being boiled in strong coffee, may be taken without inconvenience. There is some evidence to show that this property of obtunding nervous perception at the periphery resides in the alkaloid caffeine. For example, Mr. Leeds, a dentist, of New York, has published a statement that he has used as a pain obtunder a solution of twenty grains of caffeine in two ounces of a mixture of alcohol and water, with better results when operating upon sensitive teeth than even with cocaine. This anæsthetic property of caffeine is likely to have extended uses. Besides cocaine there are very few drugs possessing such a power. Bromide of potassium is anæsthetic to the throat, cocaine suspends the action of sensory nerves, and caffeine dulls the sense of taste. Another taste-destroyer has lately been announced from India in the leaves of the *Gymnema sylvestre*, which, on being masticated, are alleged to destroy the sweetness of sugar, making it feel like sand in the mouth, and to

deprive smokers from the enjoyment of a cigar; but the interest attached to this novelty attests the rarity of such properties among drugs.

Caffeine has made its principal mark in modern medicine as a cardiac tonic and diuretic, applicable in advanced cases of dropsy depending on structural defects of the heart. Caffeine was discovered and isolated from coffee by Runzi as early as 1819, and was fully described by Pelletier, the discoverer of quinine, in 1821, and was studied by many others in the interval; but it was left to Professor Gubler, of Paris, and to Dr. Samsom, of London, and some other English physicians to bring out, in our own day, its great value as a cardiac tonic. By strengthening the force of the heart, the general blood-pressure is increased, the kidneys are impelled into action, and the dropsies of advanced heart-disease disappear. The surprising effects following the judicious use of caffeine, as published by leading physicians, would of themselves be a strong testimony to show how rapidly progressive modern medicine has become.

Citrate of caffeine was first principally used in a nervous disease known as sick-headache, megrim or migraine. For slight attacks of this disorder coffee itself,—and kola beverage also, as I am able to state,—can be used with advantage. Before the introduction of caffeine, coffee was in vogue for this purpose, and is thus referred to by Trousseau:—"Slight migraines almost always yield to it. Rationalist physicians would establish many and capital distinctions, but domestic empiricism does better than the severest science, and coffee is able to cure almost all headaches, at least such as are not the prelude to or the symptom of a fever, or an acute disease."

Caffeine is known to exert a stimulating action upon the liver, and to promote the secretion of bile. This fact may be taken into account as explanatory of the reputation of kola-nut in Western Africa in the cure of liver diseases, while to its combined nervo-stimulant, anæsthetic and tonic effects may also be ascribed the success of kola in Africa when employed for the relief of dyspeptic and intestinal disorders. Sufficient proof has accumulated in Jamaica to establish the value of kola as an anti-dyspeptic. Between four and five years ago a gentleman was in correspondence with me on the subject of kola beverage, and he was induced to try it, not by my special recommendation, but by his own desire. I simply pointed out how it might be used. He afterwards reported himself as completely cured by the use of the byssi. Mr. Morris's testimony on this point, given as far back as 1884, is sufficiently positive and convincing. Since the product has come to be sold in the public markets, its use has become more general, and I have heard a good deal of approval of it. In

another case, of which I had knowledge, it proved most efficacious in warding off and cutting short attacks of asthma. I would not hesitate to recommend the kola beverage as being particularly suited to dyspeptics and to asthmatics. In asthma it may be given both in the pure nervous forms and in cardiac asthma, as an adjuvant to other medicinal treatment. As ordinary "biliousness" is but a form of stomach derangement, the use of kola beverage is likely to prove of service to those who are subject to this disorder, by preventing or diminishing the severity of the attacks.

Kola beverage, or kola-coffee, may be prepared by selecting the perfectly sound dried nut and roasting it. It may be highly roasted without losing much caffeine, for recent experiments by Dr. Paul, of London, have shown that there is very little loss of caffeine in roasting coffee unless the process be carried to an extreme. Uniformity in the size of the seed selected is an object in roasting kola-nut, just as it is in the case of roasting coffee-berries. Unlike coffee, kola-nut is destitute of a fine aroma, and the roasted and ground product is devoid of odour, unless it be a faint smell, which one of my friends has likened to the odour of spigelia, and another called it a "drug-like" odour; this however, soon passes off, and the substance is left without smell. The ground kola-coffee must be used in smaller quantity than coffee, otherwise it proves too strong a cerebral stimulant. The recognised standard for the strength of coffee is that advocated by Dr. Parkes in his work on *Hygiene;* a cup of coffee being made from half an ounce of coffee infused with about three ounces of boiling water; this constitutes strong or black coffee, and may be diluted with an equal quantity of milk to constitute *café-au-lait.* Kola-coffee made about half or even one-third this strength is quite a sufficient stimulant as a morning beverage. Tastes, however, will always vary, and there is room for a choice of strength according to preference. Persons unaccustomed to it should always remember its high stimulant power on the brain, and that it is not always suitable to be taken late at night, particularly if it be made strong. My first indulgence in a cup of kola-coffee late in the evening cost me a night of wakefulness, and imparted an active and rapidly changing flow of ideas, with an inclination to walking about and a readiness for exertion rather than a disposition to repose. It quite exceeded my experiences of midnight coffee in student days. I had simply taken my kola too strong, too much of it, and too late.

Prepared in the way I have indicated, by infusion or by boiling, (for both these methods are applicable in the case of kola-coffee) the beverage has a rich, dark brown appear-

ance, and looks like chocolate, but tastes much more like coffee. It is not oily on the surface, and there is little or no sediment. Kola, indeed, excels both coffee and chocolate in solubility, for it yields up its properties to cold watery infusions, to hot infusions, and to decoctions. The starchy matters it contains impart smoothness and a slight thickness to the decoction, but starch is not taken up by the cold infusion. The decoction, or preparation by boiling, must be held to be the most nutritious form and also the most economical. Milk and sugar are acceptable and even necessary additions, which of course add to its nutritive power.

Made in this form, kola-coffee is quite as stimulant as coffee, and is more so if made of the same weight. For nutritiveness it may be compared to chocolate, which, however, it much surpasses; but the absence of oily globules, which float on the surface of strong chocolate, makes the kola beverage more acceptable to fastidious stomachs. The starch, combined as it is with a little cocoa-butter or fat, and blended as it is with another form of starch that has been converted into the sugar of glucose, is certainly extremely bland and highly digestible; and the prospects are that this beverage, when made of limited strength, will be found suitable to the most delicate invalids. It is admirably adapted to the stage of gastric irritability in all fevers, to the irritable stomach in delirium tremens, and to the first efforts of the stomach on recovering from prolonged nausea. In nerve-exhaustion it promises to become one of the best restoratives. In the brain-torpor consequent on narcotic poisoning, as by opium, a stimulant dose of kola decoction is likely to prove an effective antidote.

The kola-nut is so very soluble that it may readily be prepared into medicated wines, medicinal tinctures, and fluid extracts, and also into chocolate, but the latter of course involves more trouble than preparing it as coffee. Prepared as a paste after the manner of chocolate, we have, however, a right to call it chocolate, for though it tastes of coffee, it nevertheless contains theobromine, starch, and a little cocoa-fat, which are the leading constituents of chocolate. The maker should introduce additional pure cocoa-butter, also aromatics, such as nutmeg, mace, cassia, or cinnamon and cloves, to suit the taste. It is to be expected that when the preparation of chocolate from kola becomes an object with manufacturers, great improvements will ensue as a result of their skill and experience. Kola-nut is also likely to come into use amongst grocers as a means for fortifying weak or adulterated coffees.

Mr. Thomas Christy, of London, recently exhibited at the Manchester Royal Jubilee Exhibition a chocolate-paste

made from the kola-nut, concerning which a most favourable account has been given of its dietetic and medicinal properties. It is thus described in an English periodical:—"Although the 'paste' resembles very much ordinary cocoa-paste, it is important to remember that it is prepared from kola-nut without any foreign admixture, and contains at least two per cent. of caffeine. It is said to be five times stronger than cocoa, and has been used as a therapeutic agent by Dr. A. L. Gihon, Medical Director to the United States Navy, with very excellent results, the mode of administration being similar to that of chocolate, viz., by mixing 10 to 15 grains with sugar, dissolving in boiling water and flavouring with a little vanilla essence. It is said also to be of great service in counteracting the ill-effects of 'drink,' devotees not being able to return to their favourite intoxicating beverage for some days without feeling nausea."

Mr. Christy sells his "kola-chocolate" at the price of four shillings per pound, but as it is five times the strength of cocoa, the price as compared with cocoa or chocolate may be held to be ninepence. The strength and compactness of such a preparation would admirably fit it to form part of army and navy supplies. In a recent communication growing out of a controversy respecting Sir Augustus Adderley's paper on West Indian exhibits at the Colonial and Indian Exhibition, read at the Society of Arts, Mr. Christy points out that its regular use is insured, owing to the favourable results attending its employment in the hospitals, and states that the paste has been ordered in quantity for army food by three European governments.

All this is confirmatory of the value of the kola-nut, and goes to show, what was stated at the outset, that there is an immediate and a prospective demand for the kola product of a most encouraging nature; and I may now turn your attention to the question of the extended cultivation of this highly useful tree.

The Kola tree seems to thrive best in hot, low and moist situations, but may be grown at all elevations not exceeding 900 feet. It would appear to do well in a strong clayey soil. It is, however, a hardy tree, and adapts itself to a wide range both of soil and climate. It is capable of cultivation in all hot and seasonable districts of the island having a rainfall of about 80 inches; and wherever bananas are grown kolas may be reared. There are many thousands of acres in various parishes as yet unoccupied, save by "ruinate," which are capable of being put into permanent plantations of kola. On certain estates sugar-cane has had to give place to bananas as a more profitable crop, and under such circumstances the kola plant may be blended with the new cultivation to great

and permanent profit. In a good soil and with sufficient moisture, the kola tree grows rapidly and stoutly; but five or six years are required for it to come into bearing, and at ten years old it is giving a full crop, estimated at 120 pounds annually, such a tree giving a return at present prices of from £4 to £6 per annum. It may be started from seeds obtained fresh from the tree, and sown in nursery-beds or bamboo pots, the plants to be afterwards set out when they have attained one or two years' growth, or one- and two-year old plants may be obtained from the Public Gardens. The season for obtaining fresh seeds, it will be remembered, expires with the month of September, so that planters desirous of establishing their own nurseries this season should procure seeds without loss of time. As regards the habit of the tree, its coming into bearing, the yield of fruit, etc., I may say that my inquiries on these points when addressed to creole peasants (who almost alone possess practical knowledge regarding the byssi) have so often been answered by comparing it to the orange tree that it may not be amiss to accept the orange tree as a standard of comparison. English writers, however, have likened the habit of the tree to that of the chestnut. Like the orange tree, it has a habit of continuous flowering when in a climate that is marked by frequent showers, thus prolonging the season of fruiting. In good soils the kola certainly is a fruitful bearer, almost comparable to the orange in this respect, while, from all that is known, it does not appear to be so exhausting to the soil as either the coffee shrub or the orange tree. A plantation of kola, therefore, must be held to be of very permanent durability and value. Whilst waiting for the kola tree to come into bearing, the planter will have to make a profit out of the ground by some subsidiary crop, the best being bananas, as these will also serve to shelter the young plants, besides being the most profitable of any catch-crop. Wherever bananas are now occupying the ground, preparations can at once be made for a more permanent crop by planting kola seeds amongst them, for by the time the bananas have begun to fail by reason of the small and unmarketable size of the fruit, the young kola trees will be growing up, and can be left to hold the ground permanently. In good rich soil the bananas might be planted ten, eleven, or twelve feet apart, with a kola at every second banana, in the direction of the lines; a plot of twenty feet square would then enclose nine bananas with four kola plants at the corners, thus leaving them twenty to twenty four feet apart. In very sheltered situations a variation on this plan might be made by omitting the bananas in the centres of the squares, so as to give the trees more light and air. A gradual thinning out of the bananas would be made as the kolas ac-

quired increased growth. After the bananas are dispensed with and the field is made clean, the best catch-crops will be leguminous plants, such as "quick-increase" peas, or the like, the seeds of which may be taken as profit while the stalks are used as a mulching to the kolas, or turned in green as a manure. Although the kola tree will no doubt bear a good deal of neglect, it will be sure to repay careful attention to cultivation by stirring and manuring the soil; the growth of catch-crops thus securing an important end. It will be possible by cultivating bananas and intervening crops, to establish a kola plantation almost free of cost, which when established could be maintained at very little expense, and would be sure to bring in very profitable returns.

The kola harvest in Jamaica is from June to September, with occasional fruits at other seasons. As soon as the pods begin to open, the seeds are mature, and the fruit may then be picked. The seed is removed from the pods, and the soft yellow seed-covering or episperm is removed from the seed. There are two methods of drying in vogue—that by drying in the shade, and that by drying in the sun. The former method is thought to give a finer appearance and a heavier yield; the latter is believed to be the better preparation for export. The kola-nut is a seed of very complex composition; and one of its constituents, glucose, has a strong attraction for water, and soon gives rise to mouldiness when exposed to damp. In a hot, moist atmosphere, like the hold of a steamer, these nuts are prone to undergo fermentation; on this account they require to be thoroughly dried in the sun until they are perfectly cured. Being of comparatively large size, they require long drying, and to withstand a sea-voyage they require careful packing. The price to be realized depends greatly or entirely on soundness on arrival, and the greatest pains should be taken to secure this end. The nuts should be packed in barrels or tierces with the same care that is given to our high-mountain coffee. As the trade in this article opens up with the United States,—as it is sure soon to do—the planters and shippers in this island will gain by the shorter voyage to America, for the risk of shipments spoiling during transit will thereby be lessened. It is also a point worthy of consideration whether kola-coffee and kola-chocolate might not advantageously be prepared in the island for export.

Gentlemen,—in bringing these remarks to a close, I wish to present you with material for reflection as an outcome of the facts developed in the course of the lecture, that this island has among its possible and actual resources the production of the four leading beverage substances of commerce —tea, coffee, chocolate and kola; and that such a combination

of resources (with many others in addition) could only possibly occur in a highly favoured tropical and mountainous island like our own Jamaica.